

Technical Note No. 5 WIND TUNNEL TESTING



This Technical Note is one of five on wind loading for the window and cladding industry. The series comprises:

- TN 2 Introduction to wind loading on cladding*
- TN 3 Wind loading on wall cladding and windows of low-rise buildings*
- TN 4 Issues relating to wind loading on tall buildings*
- TN 5 Wind tunnel testing*
- TN 6 Pressure equalisation*

Introduction

The estimation of wind effects on and around building structures is not an exact science and the guidance given in BS 6399: Part 2 is a conservative simplification of the pressures expected over a range of building structures. It is because of the unpredictability of the wind and the difficulties of conducting full-scale experiments, that the method of wind tunnel testing has evolved. These methods of assessment are considered to be of much greater direct use to the designer and are the only practical way of determining wind loads on the structure before construction.

In many cases, the justification for model tests is to obtain data which allows the position and size of the structural components to be optimised. The degree of optimisation depends on how well and how early the tests are integrated into the design process:

- At worst - when the design is already complete - tests only serve to verify the adequacy of the design;
- At best - when tests are made before the external shape is finalised - the data can be used to modify the shape to reduce the wind loading.

When wind tunnel tests are necessary

BS 6399: Part 2 states:

‘Wind tunnel tests are recommended when the form of the building is not covered by the data within this Standard, when the form of the building can be changed in response to the test results in order to give an optimised design, or where loadings are required in more detail than are given in this Standard’.

A further situation where wind tunnel testing might be considered is when the building has an unusual site location, for example, where a building is in close proximity to other tall buildings, or the topographical features are capable of altering the upwind flow (this is explained in more detail in Technical Note 4 *Issues relating to wind loading on tall buildings*).

Properly conducted wind tunnel tests provide a tailored assessment of wind effects by accurately modelling both the building and its immediate surroundings to produce realistic simulation of the local wind conditions. In some situations this may be the only way that a building can have assured structural and environmental performance, and that economy of design may be realised.

The decision as to whether or not to undertake a wind tunnel study will be clear in cases where